

The Institution of Engineers, Australia; Sydney Division  
**Engineering Heritage Committee**

## **ORAL HISTORY PROGRAM**

INTERVIEWEE: **Gordon Bruce GORE**

TAPE NUMBERS:

IEA SYD : **DWB 20, DWB 21  
& DWB 22.**

INTERVIEWER: **David Butcher**

INTERVIEW DATE: **8 March 2000**

NUMBER OF TAPES: **3**

RESTRICTION ON USE: **None**

### **INTERVIEW TAPE LOG**

This interview took place in G. Bruce Gore's office at

National Acoustic Laboratories  
126 Greville Street  
Chatswood  
N.S.W. 2067

on 8 March, 2000.

This interview is part of the Oral History Project of the Engineering Heritage Committee  
of the Sydney Division of the Institution of Engineers, Australia.

## Tape Log

Tape: IEA SYD: DWB 20, Side A		
COUNT	SUBJECT	NAMES & KEYWORDS
000-005	Tape Identification	
-	<b>Full Name</b> - Gordon Bruce GORE	
005-019	<b>Born</b> at Bondi Road, Waverley on 21 February, 1927. Both parents came from black soil country around Quirindi. Mother's father was foreman of big sheep station & father was member of police force after returning from World War I. Moved to Sydney & bought a house in west Bellevue Hill. Has one brother, 12 years younger.	Bondi Road, Waverley. Quirindi. Sheep station. Police force. World War I. west Bellevue Hill.
019-037	<b>Schooling</b> - St Joseph's School, Edgecliff - gained Intermediate Certificate in 1941. Then Marist Brother's High, Darlinghurst, for 2 years - where obtained Leaving Certificate - but did not matriculate into engineering as did not do Maths I & II. One influence on career was Buck Rogers & Speed Gordon comic books - it engendered an interest in science - during Intermediate year made a particularly heavy study of chemistry & ended up managing school chemistry lab.	St. Joseph's School, Edgecliff. Intermediate Certificate. Marist Brother's High, Darlinghurst. Leaving Certificate. Buck Rogers & Speed Gordon comic books.
037-096	<b>Choice of career in electronics</b> - when left school was a 'lost sole' - started playing music professionally at age 12 - first job with Bondi Surf Life Saving Club - played drums, base & vibraphone - did casual engagements through a musical agency. Also, obtained laboratory job with NSW Forestry Commission testing timber & went to Sydney Tech College - qualified as a wood technologist - stayed there about 2 to 3 years. Continued playing music - also completed engineering drafting course. Did quite a bit of radio servicing in friend's radio shop in Double Bay - learnt quite bit about radio & electronics. <b>Married</b> at end 1949 - accommodation bad at time in Sydney so moved to Katoomba. Joined <b>Railways Department</b> - opened & closed gates on Katoomba railway crossing for about half a year. Learnt of vacancies in <b>Postmaster General's (PMG) Dept</b> for telephone technician - saw them in Sydney & accepted into basic telecommunications course at PMG Annandale training school for 2 weeks (1951). PMG Dept only gave verbal commitment to be appointed to Katoomba - so they didn't - they appointed Gore to Lithgow - so had to travel there each day. Given job of maintaining Lithgow Small Arms Factory (only qualification two week basic course in telecommunications) - had small automatic exchange to look after plus installation & maintenance of all phones in factory. Gore did basic groundwork in electronics here.	Electronics, music - drums, base, vibra phone. Bondi Surf Life Saving Club. NSW Forestry Commission. Sydney Tech College, wood technologist. Double Bay.  Sydney, Katoomba, Railways Department. Postmaster General's (PMG) Dept. Telecommunications course, PMG Annandale training school.  Lithgow Small Arms Factory. Automatic telephone exchange.
096-328 098 >  111>	<b><u>Career &amp; responsibilities :</u></b>  <b><u>1). Postmaster General's (PMG) Department,</u></b> <b>1951 - joined as a telephone Technician's Assistant</b> - talked about this above - actual classification was ' <b><u>Exempt</u></b> ' <b><u>Technician's Assistant</u></b> - 'Exempt' meaning you are not covered by Public Service regulations - i.e. you are a temporary employee, not a permanent member of staff - after short period, was made an 'Exempt' Technician. Did some courses under own initiative - by getting books & reading them to get to stage of being able to answer exam questions - but did sit for exams. <b><u>Acting Senior Technician</u></b> - PMG asked for volunteers to go out to shale oil workings at Glen Davis to dismantle the switch board because they were closing down at the time. The area was prone to flood & when flood came they hoisted switchboard up on cables & placed it on kerosene drums to clear the flood.	Postmaster General's (PMG) Department, 'Exempt' Technician's Assistant. Public Service regulations. 'Exempt' Technician   Acting Senior Technician. Shale oil workings at Glen Davis. Switchboard.



127 >	That job was based at Rylstone - was an acting Senior Technician's position. Stayed at Rylstone for a while - thought getting nowhere - had to go Sydney - & enrol in a Radio Engineering course at Sydney Technical College.	Rylstone. Radio Engineering course, Sydney Technical College. City East Exchange
138 >	Applied for a transfer & was given job on area maintenance at City East Exchange. PMG put Gore through couple of 2 week courses at Annandale training school - & Gore became their 'trouble shooter' servicing phones & switchboards with utility truck - around Surry Hills, Woolloomooloo & Darlinghurst.	Surry Hills, Woolloomooloo & Darlinghurst.
146 >	Did one year course at Sydney Technical College to obtain university entrance & matriculated - so could enter university - thus overcoming earlier difficulty of not matriculating - <i>refer Counter 019-037 'Schooling' on this tape side.</i>	Radio Engineering Course, Sydney Tech College The Institution of Engineers, Australia PMG in-house 'Trainee Engineer' course.
164 >	<b>Enrolled in Radio Engineering at Sydney Tech College</b> - completed one year. The Institution of Engineers, Australia then introduced a barrier - you must have formal recognised qualifications to be able to be an engineer in the government. Because of technical shortages in the early 1950's, PMG Dept had Senior Technicians & other unqualified people acting as engineers - so PMG said we will try to get them formally qualified - we will advertise a course acceptable to The Institution of Engineers & the Universities & they called the course 'Trainee Engineer' course as distinct from "Cadet Engineer" course. You were eligible only if you had two years minimum direct technical experience in the PMG plus the entrance requirements into the course.	Universities. PMG Dept, 'Trainee Engineer' 'Cadet Engineer'
173 >	Applied for first course & missed out - all those acting engineers got first course. So enrolled in year 2 of Radio Engineering course & was getting towards end of year 2 when PMG advertised Trainee Engineer course again - applied & this time accepted. Gore had problem - was only an 'Exempt' Technician which meant was not eligible for a promotion to Trainee Engineer so PMG organised Gore do clerical examination to get permanency - did clerical examination - & passed. Then Gore advised to request Public Service Board to appoint him to PMG Dept - so did & was appointed as Clerical Assistant - North Sydney Exchange. Immediately 'Professional Training' said 'good, you're in - Clerical Assistant to Trainee Engineer - bang!' - so appointment appeared in Gazette - was still working as an Area Technician. Gore commented - imagine all those Supervising Technicians, Senior Technicians - all qualified & acting as engineers & here is Bruce Gore Clerical Assistant appointed Trainee Engineer above them - got 34 appeals against him - went down to the professional engineering office a very worried person - divisional engineer looked at him & laughed - he said if any of these people are good enough to beat you, you have almost 2 years of the Radio Engineering Diploma under your belt - we want them too so don't worry about it.	Public Service Board. Clerical Assistant - North Sydney Exchange.  Gazette.
191 >	None of those appeals were heard to Gore's knowledge, so went in as a <b>Trainee Engineer</b> with Technician's salary all the way.	Appeals to appointment.
221 >	Had planned to enrol in the <b>PMG in house Trainee Engineer course</b> - when went to see 'Professional Training', they said don't care what you do, provided you are an engineer in 4 years. Learnt afterwards why - PMG said why should we run our own course? - let's have university do it for us. PMG listed the items they wanted their engineers to study to complete the course - the professor at UNSW said if you want those topics covered, you will have to have your engineers qualify in 42 subjects, now as full BE course is only 24 subjects, we strongly recommend you have them enrolled in the BE course. This is the reason they said go off & do your own course. So converted from Radio Diploma course to full time Univ. Engineering Degree course.	Radio Engineering Diploma.   Course topics. Professor at UNSW.  BE course.



249 >	Did 4 full time years at <b>University of New South Wales</b> - did Year I with exemptions plus something out of Year II (due Radio Engineering Diploma course work completed). <b>Graduated 1961 - Bachelor of Electrical Engineering (Communications &amp; Electronics).</b>	University of New South Wales. Bachelor of Electrical Engineering (Communications & Electronics). Music.
260 >	When started university course, had to stop playing music because one requirement of music is that people ring you up to give you jobs & if you say no once due to course commitments, study etc. - they don't seem to ring you up again - after that dropped out of music.	
280 >	After graduating, did not play music for first year, then joined <b>Commonwealth Acoustic Laboratories</b> after that. <b>When first qualified as engineer with PMG</b> , was appointed to Nepean Division as had expressed preference for country service - this was for two weeks - then transferred to Exchange Installation at Daley Street Exchange. Supervising Engineer in charge of all installation groups had a problem - 00 complaints network could not test lines. When they had a complaint, they had to ring up local exchange & ask technicians to test the lines for them. The Supervising Engineer organised a project to create a 'testing network' (called <b>Elsa</b> - Extended Local Service Area - <b>Test Network</b> ) - a network which was available for complaints operators to dial up & test lines & that would tell the condition of the line - whether it was out of service, busy, or whatever.	Commonwealth Acoustic Laboratories. PMG - Nepean Division. Exchange Installation at Daley Street exchange.  00 complaints network.
304 >	<b>Why leave PMG &amp; join Commonwealth Acoustic Lab?</b>	Elsa (Extended Local Service Area) Test Network.
316 >	Mostly because of interest in music & hi-fi audio & acoustics in general. NAL advertised a position as Engineer Class 2 - joined in January 1963. By that time had completed the <b>Elsa network</b> - two people, a Supervising Technician & Gore were given the project & designed quite a bit of the switchgear, had lines installed between the exchanges & had to connect all the gear. That project after Gore left was upgraded to a very high standard of switching equipment which is in existence at the moment.	
328-386	<b>2). Commonwealth Acoustics Laboratory</b> <b>January 1963 - joined as Engineer Class 2</b> - located in Custom's House at Circular Quay. There for approx one year & then moved to No. 5 Hickson Road which was an old wool store. The Commonwealth Acoustic Laboratories, of necessity, had always been based in old wool stores - places with timber framework & big heavy sandstone walls. Reason - modern buildings have structural steel frameworks & if anyone drops a pin in the basement, recording instruments in roof start to jump around. When deal with a wooden structure, everything gets damped down. One of misconceptions in an acoustics laboratory is that people imagine that you are trying to record very high levels of sound - it is just the opposite - you are trying to record very low levels of sound free from interference. Gore talked about how aim is for the lower dynamic range which means of necessity have to get the background noise level way down. Gore's immediate boss, Jack Rose, & Gore were only two engineers working as engineers in the Commonwealth Dept of Health at the time. Jack was conducting noise investigations for the Armed Forces. <b>Continued on Tape IEA SYD : DWB 20, Side B.....</b>	Commonwealth Acoustics Laboratory, Engineer Class 2. Custom's House, Circular Quay. Hickson Road, old wool store. Modern buildings, structural steel framework. Recording instruments. Levels of sound. Interference. Distortion.
375 >		Background noise. Jack Rose. Engineers in Commonwealth Dept of Health.
386	<b>End of Tape IEA SYD : DWB 20, Side A</b>	



## Tape Log

Tape: IEA SYD: DWB 20, Side B		
COUNT	SUBJECT	NAMES & KEYWORDS
000-003	Tape Identification	
003-058	<p><b>Continued from Tape IEA SYD : DWB 20, Side A..... projects worked on when Gore first joined Commonwealth Acoustic Laboratories.....</b></p> <p>Jack Rose was looking after Armed Forces, big industry only if on a national basis (to avoid favouring of State departments), semi government instrumentalities &amp; bodies. Had also Leichhardt Council - reason because of it's wide base of activities - covering waterfront, residential, industrial - i.e. whole gambit of noise problem.</p> <p>Reason for investigations was Comm. Acoustic Lab's Charter to investigate effects of noise on man - would go out, take recordings of noise, analyse problem &amp; try &amp; alleviate problem. First job involved taking a recorder &amp; going out to a Navy base at Artarmon where they had a machine with a noise problem. Gore localised the mechanism producing the noise &amp; went into design with Navy people to successfully remove problem. Thereafter widened scope to office, teleprinter type noise where designed acoustic hoods to quieten them down - whole range of things where advised on room acoustics, quietening down reverberation in rooms. Acted as consultant &amp; organisation then implemented recommendations. Talked about introduction of background noise to mask private conversations in offices.</p>	<p>Commonwealth Acoustic Laboratories. Jack Rose. Armed Forces, big industry, semi government depts. Leichhardt Council. Comm. Acoustic Lab's Charter.</p> <p>Navy base at Artarmon.</p> <p>Office, teleprinter type noise, acoustic hoods. Reverberation in rooms.</p>
058-078	<p><b>1966 - promoted to a (Senior) Physicist Class 3 position.</b></p> <p>Gore was Engineer Class 2 &amp; Physicist Class 3 position became available - Gore said because of his post graduate studies had completed enough physics to be classed as a Physicist. Job was dedicating more to noise rather than engineering - this carried on for about 3 years. Navy Dept had a lot of individually compartmented sections, each doing their own thing &amp; completely ignoring their partners - problem was they were not implementing Comm Acoustic Lab's advice - so decided no use carrying on, so closed down section. So Gore was an unattached Physicist - so in <b>1972 - reclassified to an Engineer Class 3.</b></p>	<p>(Senior) Physicist Class 3.</p> <p>Navy Dept.</p> <p>Engineer Class 3.</p>
078-091	<p><b>1972 - graduated as Master of Engineering Science (Communications &amp; Electronics).</b> Done part-time at University of New South Wales over about 5 years.</p>	<p>Master of Engineering Science (Communications &amp; Electronics), UNSW.</p>
091-250	<p><b>Promoted to (Principal) Engineer Class 4 position in charge of National Acoustic Laboratories (NAL).</b></p> <p>Located at Hickson Road - the head office of NAL. NAL had quite big network of testing laboratories - audiology where carry out hearing tests for pensioners &amp; other people eligible under National Health Act for issuing of hearing aids. Part of the organisation Gore has always been with is the head office &amp; research laboratories where do development of clinical tests, investigating effects of noise on man, etc.</p> <p><b>Name change from Commonwealth Acoustic Laboratories (CAL) to National Acoustic Laboratories (NAL) - occurred about 1977-78 - Labour Govt at time regarded Commonwealth as a 'nasty word' so there was action all through the public service for name changes &amp; so name was changed to National Acoustic Laboratories (NAL). No change in organisation or structure or effect on work done.</b></p>	<p>(Principal) Engineer Class 4, Hickson Road. National Acoustics Laboratories (NAL). Audiology, hearing tests, pensioners, hearing aids. National Health Act.</p> <p>Name change from Commonwealth Acoustic Laboratories (CAL) to National Acoustic Laboratories (NAL). Labour Government.</p>



120 >	<p><b>Privatisation of organisation</b> in about 1985-86.</p> <p>Gore was at Hickson Road when Promoted to Engineer Class 4 in charge of test facilities &amp; got involved in finishing off the new test facilities at Greville Street, Chatswood. When Gore got to Chatswood he found the government had changed it's policy - it said in effect 'thou shall go commercial'.</p> <p>During finishing of the Chatswood test facilities, ran out of money &amp; Minister for Health asked acting Prime Minister for additional moneys which had been held back for completion to be released &amp; the acting Prime Minister said OK, I'll release it on one condition that you make every endeavour to obtain a return on investment by commercialising the use of the test facilities. Facilities had been developed purely for use in research by NAL &amp; government organisations, universities, National Measurement Laboratory (just up the road - did not build acoustic test facilities as could use ones at NAL - that was the theory - but they have not yet used them in all these years). So, here we are with a world class test facility, arguably the best in the world technically in performance, six million dollar facility (1978 prices) - try &amp; get some money back on it. But you must not be too high in your charges because we want tax payer to get something back -but we don't want to hit them too hard with the charges. Gore went over costs of everything, wrote test facilities off in 40 years &amp; priced write off over a 20 year test period, worked out hiring charges &amp; then called in Canberra &amp; said do you approve? Accountants from Canberra came &amp; went over all Gore's costings, etc &amp; said yes your charges are reasonable, we approve their implementation.</p> <p>So then Gore went to market - how to market a completely unknown test facility (1985-86)?</p> <p>Gore said they moved into Chatswood in May 1985 - building was officially opened (thinks) in May 1986.</p>	<p>Privatisation. Hickson Road.</p> <p>New test facilities, Greville Street, Chatswood. Money, Minister for Health, acting Prime Minister.</p> <p>Research by NAL, government organisations, universities, National Measurement Laboratory.</p> <p>Write off period, hiring charges. Canberra.</p>
184 >	<p>Have built it up to point where seem to be current de facto standard test organisation in Australia.</p> <p>Organisation still much involved in <b>research &amp; development of hearing aids</b> - organisation has been split - divided into Australian Hearing Services which caters for the national health scheme, issuing of hearing aids, obtaining hearing aids. Have given up own design of hearing aids - passed it over to a joint venture between NAL &amp; a commercial organisation who do design &amp; arrange the manufacture of hearing aids for NAL.</p>	<p>Standard test organisation in Australia. Research &amp; development of hearing aids. Australian Hearing Services, national health scheme.</p>
200 >	<p>Development involves two phases - hardware (which Gore managed for 18 years) to research &amp; develop the components &amp; hearing aids based on performance &amp; Gore's main charter or personal directive in that was efficiency at minimum cost. For example, in <b>batteries</b>, if NAL purchased batteries - when first looked at ,were purchasing 400,000 batteries per year for body aids - looked closely at the battery chemistries &amp; the hearing aid demands on the batteries - &amp; found if changed chemistry from mercuric oxide to manganese dioxide chemistry we halved the cost of each cell &amp; got same battery life for hearing aid requirement - this immediately halved battery cost. At time were paying a contract price of just over one dollar per battery cell.</p>	<p>Design of hearing aids, joint venture NAL &amp; commercial organisation. Batteries, mercuric oxide to manganese dioxide.</p>
212 >	<p>When started going into miniature hearing aids using button cells - silver oxide &amp; mercuric oxide, demand reached up to five million cells per year - with this kind of engineering investigation, Gore said he introduced changes which saved NAL over three million dollars over 5 years.</p> <p>Gore's aim was efficiency at minimum cost &amp; this approach was adopted in every component in hearing aid design to all components in the chain.</p>	<p>Batteries, button cells, silver oxide, mercuric oxide.</p>



250-321	<p><b>1992 - Retired from NAL - at age 65.</b></p> <p>Could have retired earlier, but was very interested in job - said not often given a test facility &amp; told it is your's - market it here &amp; overseas - so was very interested in the job.</p> <p>Has maintained a active interest in hearing research, started as general consultant, did some work for Atomic Energy Research facility at Lucas Heights (lectures on acoustics &amp; carrying out noise investigations), worked for a private consultant for a while. Then got a call from NAL about 3 years after retiring - the person who had taken over Gore's place developed cancer in one leg &amp; he went to hospital for 3 months - he is cured now. Gore was asked if could come back &amp; run the show for 3 months while he is in hospital - did this for 3 months, he came back, asked if would stay on another three months to tide over the period. Is currently a part- time acoustic consultant at NAL, Chatswood.</p> <p>One very interesting job since retirement - ran <b>series of courses on use of miniature transducing devices in relation to the acoustics of rooms for best optimum use</b> - involved intelligibility of speech, background noise, general room acoustics, etc.</p> <p>Recalls with two other people (who looked after other aspects of the course) carried out - broadened the course out - conducted five or six of those four day courses over a period of three or four years. Required a lot of lateral thinking, original thinking, optimum use of components &amp; placing components to get maximum recording intelligibility, etc.</p>	<p>Retirement.</p> <p>Consultant. Atomic Energy Research facility, Lucas Heights.</p> <p>Part time consultant, NAL, Chatswood. Miniature transducing devices. Intelligibility of speech, acoustics of rooms.</p>
300 >		
321-388	<p><b><u>Work History &amp; Events :</u></b></p> <p><b>1962 - Elsa Test Network creation</b> - whilst Engineer Class 1 with PMG.</p> <p><i>This was introduced earlier in Tape IEA SYD ; DWB 20, Side A, at Counter 280.</i></p> <p>Originated from 00 complaints requirement. When 00 complaints received a complaint from a client, they had to ring the local exchange involved &amp; have the line checked which required time &amp; was inefficient. So needed a dial up network which would test the line &amp; report it's condition so that the client ringing 00 complaints could find out if it was busy or out of order or whatever. Did not have a network at the time - it is more or less a parallel network which could operate in conjunction with the general telephone network which enabled the 00 complaints girls to test lines anywhere within the general test network. It involved the design &amp; development of new switches, linking all exchanges with the cable network. One pair of wires is enough between exchanges because complaints demand on any given line in the network is not high.</p> <p>Two people - a Senior Technician &amp; Gore, developed this network &amp; just at the end of the development - brought out all the plans, had everything organised - then Gore applied for the job with the Commonwealth Acoustic Laboratories - &amp; left them with it. Another engineer took over, completely automated the test desk into an electronic network which Gore believes is very good.</p>	<p>Elsa (Extended Local Service Area)</p>
388	<b>End of Tape IEA SYD : DWB 20, Side B</b>	

## Tape Log

Tape: IEA SYD: DWB 21, Side A		
COUNT	SUBJECT	NAMES & KEYWORDS
000-005	Tape Identification	
005-093	<p><b>1963 - Automatic Audiometer development</b> - whilst Engineer Class 2 with Commonwealth Acoustic Laboratories.</p> <p>Audiometer is basically an amplitude calibrated amplifier through which you feed discrete frequencies &amp; object of it is to try to have patient identify quietest level of this assembly of frequencies so you can graph a curve of their minimum hearing, which is called their threshold of hearing - it must be extremely accurately calibrated amplitude wise &amp; frequency wise.</p> <p><b>Two types of automatic audiometers :</b></p> <p>1). <b>Bekesy audiometer which automatically varies the volumes</b> - gradually goes down all the way. When reach quietest sound you can hear you press a button &amp; it reverses &amp; amplitude increases. As audiometer automatically changes frequency, you have level going down &amp; up, following this minimum level curve. This is Bekesy which CAL not interested in at time.</p> <p>2). <b>Automatic audiometer which has composite signals</b>, type of test called Rainville test - which requires a two channel automatic audiometer which mixes the channels. It has a background of noise &amp; other channel superimposes an in phase component of noise which increases the volume &amp; drops the volume, increases the volume &amp; drops the volume a random number of times - idea is for ear to discriminate between the changes in amplitude with the background noise. This is an automatic test - is administered automatically &amp; requires timing networks in the audiometer to sequence the pulses &amp; it requires the combination of two signals automatically.</p> <p>There are other tests involved in super position of noise &amp; pulses - that is, a background of noise &amp; then pulses superimposed on it &amp; the client is supposed to identify these pulses masked by the background of noise.</p> <p>This Audiometer which Gore designed at CAL was his first engineering task - it involved two completely identical channels, automatic timing networks &amp; mixing networks as well. It was a multi purpose instrument - quite a few of these pre designed tests are built into it - but the level was still controlled by the operator. The operator had a small light appearing for each channel whenever it released a signal &amp; he could control the number of presentations - he could also manually vary the combination of these signals by just keying in an extra pattern to avoid any client getting used to the pattern &amp; identifying it. This was all the audiometer was - it's uniqueness was it was the first transistorised audiometer which we had ever seen - previous audiometers had all been manual single channel ones using valves. This used the OC44 &amp; OC45 germanium transistors which had just appeared on the market in 1961 - at the time it was fully designed &amp; introduced into production, it was technically obsolete as then had silicone transistors on market. At a Senior Technicians' technical conference in 1972, Gore had overheard the Senior Technician from Perth bartering to obtain a couple of Gore's audiometers in lieu of the brand new commercial model that had just appeared on the market - was only audiometer that NAL has designed &amp; manufactured - Gore felt it was really good.</p>	<p>Automatic Audiometer. Commonwealth Acoustic Laboratories.</p> <p>Amplitude, frequency. Threshold of hearing.</p> <p>Bekesy audiometer.</p> <p>Audiometer with composite signals. Rainville Rest. Two channel automatic audiometer.</p> <p>Background noise.</p> <p>Superposition of background noise &amp; pulses.</p> <p>Automatic timing networks &amp; mixing networks.</p> <p>Transistorised audiometer. Valves. Germanium transistors.</p> <p>Silicone transistors. Senior Technicians' Technical conference. Perth.</p>



093-145	<p><b>1966 - Senior Physicist - Head of Section,</b>  <b>-developing noise standards</b>  <b>-surveying noise levels &amp; problems on naval ships</b>  <b>- consultancy &amp; noise investigation services to armed forces, government &amp; semi-government departments</b></p> <p>Gore commented that he cannot say too much about this as most of the information is still classed as secret.</p> <p>At time, only standards available were developed for the Navy during the years of World War II &amp; they weighted heavily against the person who was exposed to the noise. They under evaluated the damage that could occur, so were commissioned to develop these standards. It involved a two prong approach - were required to go out on Navy ships on sea trials (after being overhauled in dry dock) - spent about 3 or 4 days on them - &amp; do measurements. Had to go around all of the compartments, taking measurements &amp; looking for any specific noise problems that could be treated by engineering noise reduction methods or whether ear muffs must be worn. Other aspect was to build up a library of noise spectra that could be equated against the hearing conservation criteria for dose so that could specify maximum noise exposure in different kinds of spaces -eg engine room, officers' &amp; men's messes, etc. It involved a report on each ship which was quite comprehensive. After doing about 8 or 9 ships, developed criteria which was forwarded to the Navy.</p>	<p>Senior Physicist, Head of Section.  Noise Standards.  Naval ships.  Armed Forces, government &amp; semi-government depts.</p> <p>World War II.</p> <p>Navy ships, sea trials.</p> <p>Noise problems, engineering noise reduction.</p> <p>Hearing conservation.  Noise exposure.</p>
145-230	<p><b>1968-1978 - advised PMG Research Laboratories in the application of magnetic coupling devices for coin operated public telephones (for use with hearing aids)</b></p> <p>Magnetic coupling provides a means of transferring the magnetic field out of a telephone handset earpiece into a hearing aid without the hearing aid picking up any of the street noise or any of the local noise in the location of the telephone. As the telephone is designed to minimise this anyway (it is designed to emphasise the speech from the other end of the phone), you get a much better speech to noise ratio &amp; you can discriminate the intelligibility in the conversation much better. Any kind of background or interfering noise drops the discriminating ability of a person to hear this.</p> <p><b>Mechanism of discrimination</b> - discrimination in speech is extremely important because what happens is - when you acquire a hearing loss two things happen. First of all you lose the ability to hear the sound itself, but probably more important is you lose the ability to discriminate or identify particular items in the sound. A normal human ear is a very excellent analyser - you can discriminate quite a few things, eg. you can talk to a person in a pub &amp; you can mentally screen out all conversations going on around you - that is because of the analysing ability of the ear. When you acquire a hearing loss, it falls in proportion to the amount of hearing disability - the ability to discriminate falls off in direct proportion to the amount of hearing loss you acquire &amp; you begin to lose that ability to discriminate. This is why if you are in a room of people talking &amp; you have lost your ability to discriminate you are completely off the air - you can't take part in anything - whereas if you have normal hearing you can just concentrate on the person &amp; you can screen out that.</p> <p>With people in a room, a lot of people talking forms background noise - in case of a public telephone in a street you have cars going past &amp; other background noise. All this interferes with the information you are trying to discriminate coming out of that telephone handset . If you can use a coil to couple to telephone hand set, you can completely mask out all that background noise - whereas if you have to use the hearing aid microphone you include all that noise so you lose your discriminating ability.</p>	<p>PMG Research Laboratories.  Magnetic coupling devices for coin operated public phones (for use with hearing aids).  Magnetic field.  Telephone handset,</p> <p>Background noise.</p> <p>Discrimination in speech.  Hearing loss.</p> <p>Human ear, analyser.</p> <p>Background noise.</p>



	<p>This is the reason why that device for that type of operation was sought by the PMG Research Dept in Melbourne.</p> <p>To adopt in public telephones - a telephone earpiece is optimised for acoustical output - they deliberately screen the magnetic field to make the earpiece more efficient acoustically. The process involved leaking a little bit more of the magnetic field so that the telecoil fitted into the hearing aid could couple to it. That was basically it - it meant design optimising the earpiece for use with hearing aids.</p> <p>Technique developed for normal auditorium applications ? - Gore felt that probably telecoil is but it has multiple use - you could put the loop systems in homes, offices, anywhere, not only auditoriums, a lot of churches &amp; halls have them.</p>	<p>PMG Research Dept in Melbourne.</p> <p>Telecoil in hearing aid.</p>
230-323	<p><b>1968 - Government Pensioner Hearing Aid Scheme introduced.</b></p> <p>For many years the Labour platform had been free hearing aids for all. Labour Government got in &amp; they opened up the hearing aid side of the National Health Scheme for free hearing aids for everyone. This involved a minor revolution in NAL because were producing about 400 hearing aids per month at the time. It involved boosting production to about 800 hearing aids a week &amp; it was also the introduction of a new type of ear level hearing aid called 'Calaid' which was only hearing aid in Australia at the time using an integrated circuit.</p> <p>'Calaid' is the registered trade name for the Commonwealth Acoustic Laboratories hearing aid - it covers a whole range of models, from a body aid to a behind the ear aid to an ear level aid.</p> <p>The reason for the <b>different types of hearing aids</b> is because of the amplification needed to cater for different degrees of hearing loss. A person who has a very mild hearing loss can wear an ear level hearing aid because the microphone &amp; the ear phone are close together, the gain of the amplifier is limited before it starts feeding back &amp; whistling. In the behind the ear hearing aid, the microphone &amp; the ear phone are further apart &amp; you can get higher levels of amplification. In the body aid, you have the ear phone up on the ear &amp; the microphone down on the chest so you can get a much higher amplification again. So the very profoundly people have to wear body aids &amp; the mild hearing loss people can wear in the ear hearing aids &amp; get the advantage of head baffle effect - this is the localisation of sound by turning the head you can tell which direction the sound is coming from.</p>	<p>Government Pensioner Hearing Aid scheme.</p> <p>Labour government. National Health Scheme. NAL, National Acoustics Laboratories.</p> <p>Ear level hearing aid. Integrated circuit. 'Calaid', registered trade name for Commonwealth Acoustic Laboratories hearing aid.</p> <p>Different types hearing aids - body aid, behind the ear aid, ear level aid. Amplification, amplifier gain. Microphone, ear phone.</p>
283 >	<p><b>As CAL located in central Sydney - how were services provided to people in country NSW &amp; interstate ?</b></p> <p>The CAL (now NAL) referred to is the head office &amp; research department of the organisation (located at Chatswood). The organisation also maintains visiting laboratories &amp; permanently staffed laboratories all around Australia for testing people. They implement the test procedures &amp; devices developed &amp; organised at Chatswood.</p>	<p>CAL (now NAL) services in country NSW &amp; interstate. Chatswood. Visiting laboratories &amp; permanently staffed laboratories.</p>
298 >	<p><b>In the research, development &amp; design of the hearing aid there are two aspects</b> - the hardware side of it, which are the integrated circuits &amp; miniature controls, microphones, batteries &amp; then there are the test procedures which is the so called software side of the thing. NAL are currently (i.e. in year 2000) carrying out only the software side of the development. All of the hardware side has gone out to a joint venture which is run by the Australian Hearing Services &amp; a commercial organisation (chosen by contract - Gore could not recall name of current organisation). Gore thought the current contract runs out this year &amp; he was not sure of the contract duration.</p>	<p>Hearing aid hardware, integrated circuits, controls, microphones, batteries. Hearing aid software, test procedures. Australian Hearing Services &amp; commercial organisation,</p>



323-368	<p><b>1969 - Engineering Section was expanded into three groups,</b></p> <ul style="list-style-type: none"> <li>- Hearing Aid development &amp; design</li> <li>- Engineering services</li> <li>- Noise services</li> </ul> <p>At time, Gore was in charge of the Engineering Section. The Navy noise investigation project had closed down &amp; Gore had transferred back to the Engineering Section. The Engineering Section was under the direction of Jack Rose. Jack had to go to hospital for some months for a very bad back operation &amp; this was during the period of escalation of the manufacture of hearing aids, escalation in demand for noise services &amp; the need to look more closely at hearing aid design. So Gore divided the Engineering Section into three to cater for these types of demands. This organisation split has stayed - they did not re-amalgamate when Jack came back.</p> <p>When Jack came back to join the organisation, Gore had nowhere to go - was given the choice to remain in Engineering or go into Hearing Aid Design &amp; Development. Gore chose the latter &amp; that is how Gore came to head the Hearing Aid section for 18 years.</p>	<p>Engineering Section three groups,</p> <ul style="list-style-type: none"> <li>- Hearing Aid development &amp; design.</li> <li>- Engineering services.</li> <li>- Noise services.</li> </ul> <p>Jack Rose, head Engineering Section.</p> <p>Hearing Aid Design &amp; Development.</p>
368-407	<p><b>1969-1984 - Head of Hearing Aid Development &amp; Design Section,</b></p> <p><b>Integrated circuits</b> appeared about 1962-63 in 'Calaid E' hearing aids - Jack Rose steered the engineering side of it &amp; Gore assisted him.</p> <p>Had quite a lot of trouble because Australian industry wasn't used to moulding plastic casings 2 or 3 mm thick at the time &amp; they did not have the techniques to make the miniature dies so had to electrically etch the dies to make the components. So began with a left ear die &amp; the year after that developed a right ear die because the type of hearing aid design CAL chose was polarised. But it turned out to be quite a success.</p> <p>Outside of Australia - some integrated circuits in hearing aids had appeared in Chicago (Gore could not recall name of organisation who made them) - Gore only knew of the one organisation.</p> <p><i>Continued on Tape IEA SYD : DWB 21, Side B.....</i></p>	<p>Head of Hearing Aid Design &amp; Development. Integrated circuits. 'Calaid E' hearing aids.</p> <p>Australian industry. Moulding plastic casings. Miniature dies.</p> <p>CAL (Commonwealth Acoustic Laboratories)</p> <p>Chicago, USA.</p>
407	End of Tape IEA SYD : DWB 21, Side A	

## Tape Log

Tape: IEA SYD: DWB 21, Side B		
COUNT	SUBJECT	NAMES & KEYWORDS
000-004	Tape Identification	
004-101	<p><b><i>Continued from Tape IEA SYD : DWB 21, Side A.....</i></b>  <b><i>1969-1984 Head Hearing Aid Section.....</i></b>  <b>Why were CAL (later NAL) making their own hearing aids rather than buying them commercially ?</b> - CAL started to make own hearing aids back in late 1940's using valves because of prohibitive cost of imported ones. CAL carried out manufacturing, optimising costs - was purely a question of economies of scale. If have requirement for a large number of hearing aids of a particular type, then you tool up &amp; make it if the cost warrants it. If the numbers are quite small, it is much cheaper buying the hearing aid direct on the market. Problem is commercial hearing aids at the time left a lot to be desired - their performance was not nearly as good as the CAL produced one from a client perspective. CAL had done comparisons &amp; clients seemed to favour the type of engineering used in the overseas hearing aids, yet preferred CAL's performance features because the hearing aids sounded better. This was largely because of lack of experience of local industry in making miniature components. Overseas hearing aid firms get their own tradesmen &amp; train them in making of micro miniature components &amp; their techniques seem to make slightly better parts. So CAL developed a purchasing procedure which purchased overseas components where possible. If they were not available, CAL designed &amp; developed own components. About mid 1960's there was a lack of integrated circuits which were efficient enough or good enough in performance to use in CAL's hearing aids so CAL got into design of circuits locally with AWA, Philips (naming just two). CAL sourced out design expertise, specified performance &amp; had integrated circuits made locally (by AWA, Philips, etc. who had the plant in operation) - they were capable of manufacturing to CAL's requirements. CAL worked with these organisations in the development &amp; packaging of the devices to fit certain design of thick films &amp; miniature printed circuits so that they would just drop in. So had a combined development phase where purchased large numbers of these devices &amp; incorporated them direct in production line. CAL divorced manufacturing from development side for efficiency sake - Gore had two engineers &amp; two technical officers. Had long development times due to lack of staff. On manufacturing side did a little better - problem was creating positions in government environment - became very obvious at start of implementation of the widening of the National Health Scheme for the Pensioner Scheme to be introduced. So led a team to contract this out - nursed the along until they were in satisfactory production for CAL. Without private industry involvement would not have been able to build up the numbers because the government would not let CAL recruit the staff - possibly it was a wise choice - because it began letting local industry be trained in doing micro miniature work. Was run by open tender - Gore told a story of how one tenderer had quoted very low - when shown a device - went pasty white - clearly had not appreciated what was involved - had badly under quoted - so quickly withdrew his tender. Gore said part of job was to go out to each tenderer to make sure they precisely understood what they were tendering for because they had no expertise in miniature devices.</p>	<p>Hearing aids. CAL (later NAL)</p> <p>Comparison between CAL produced &amp; commercial hearing aids.</p> <p>Local industry experience, miniature components.</p> <p>CAL purchasing procedure. CAL designed &amp; developed components. Integrated circuits.</p> <p>AWA, Philips.</p> <p>Miniature printed circuits.</p> <p>National Health Scheme. Pensioner Scheme. Private industry involvement.</p>



101-190	<p><b>1978 - appointed RAAF Reserve as Squadron Leader</b></p> <p><b>Consultant on noise,</b></p> <p><b>Reserve policy</b> - Gore said if you have a expertise they needed, they created a position - usually Pilot Officer or Flying Officer - &amp; when you are appointed to one of those base grades, they say how much money are you earning in your position in private industry. Then they pick the rank that you would get equivalent money &amp; then they put you up in a acting capacity.</p> <p>The reason Gore dropped out of the RAAF Reserve was because the retiring age for Squadron Leaders was 55 - so served about 4 years. Position was in an advisory capacity - Gore said he was the only acoustical consultant in the entire armed forces.</p>	<p>RAAF Reserve, Squadron Leader, consultant on noise.</p>
128 >	<p><b>Introduction of Noise Exposure Contour Lines</b> - with Wing Commander John Grey - both attached to a section called DAFMED - Defence Air Force Medical Section based &amp; with headquarters in Canberra. John Grey was on occupational health side &amp; he was dealing with CAL in development of a hearing conservation program - Gore said he got involved because of his Navy noise section &amp; they knew each other - Grey organised it &amp; so Gore joined up in Reserve.</p> <p>Activities such as engine warm up are carried out with the aircraft in a particular position on the tarmac. When the engine is warming up it emits a certain amount of noise &amp; if you do contour plots around the aircraft, you can pick out the 90 dBA curve, where if you are inside that you are in a hearing conservation danger area &amp; you must wear hearing protection. Put contour lines on the tarmac in different coloured paint (no numbers), depending on type of hearing protection required - i.e. ear muffs (high sounds when you are close to the noise source) or areas where you can walk without hearing protection on.</p> <p>Whenever go out to an Air Force base, will find these contour lines all over the tarmac, into hangars, out of hangars, will also find them appearing on commercial aircraft tarmacs. Gore commented - very satisfying if go to Air Force bases - see people putting on hearing protection.</p> <p>In Navy, it had on ladder going down into the engine room - a skull &amp; cross bones painted - 'hearing protection must be worn'. At Mascot airport you'll notice people always wearing ear muffs when they are guiding aircraft in the open.</p>	<p>Noise Exposure Contour Lines.</p> <p>Wing Commander John Grey, Defence Force Medical Section (DEF MED).</p> <p>Hearing conservation.</p> <p>Aircraft engine warm up. Tarmac.</p> <p>Contour plots.</p> <p>Hearing protection.</p> <p>Air Force base. Tarmac., hangars.</p> <p>Navy.</p> <p>Mascot airport.</p>
190-383	<p><b>1979 - Orono Conference on hearing aid design,</b></p> <p>Gore said he got invitation from University of Maine, situated at Orono, USA, to be an invited speaker at a conference on hearing aid design. When got to the USA - all expenses paid by University of Maine - heard that the conference had been called off because of problems in the USA with fuel - they could not get enough registrants. At time had a conference going on - on hearing conservation - so Gore joined this as an invited speaker. A few people had turned up for the hearing aid conference - they said we will give you a morning &amp; you can talk to them about hearing aid design &amp; development in Australia - so Gore had to conduct a entire seminar on hearing aid design &amp; development, components, battery efficiency, etc - fortunately at time Gore</p> <p><b>had a device with him which CAL had developed in conjunction with the CSIRO - a working prototype of a wireless communication system which operated on the near field transmission characteristics of a magnet</b> - it worked on the inverse cube law. The uniqueness of this device was that you could have three transmitters operating on the one frequency in one room without interference &amp; the person wearing a receiver could move from receiver 1 to receiver 2 to receiver 3, each completely independent transmissions &amp; the division was spatial</p>	<p>Conference on hearing aid design.</p> <p>University of Maine, at Orono, USA.</p> <p>Hearing conservation.</p> <p>Hearing aid design &amp; development, components, battery efficiency.</p> <p>CAL.</p> <p>Wireless communication system, near field transmission characteristics of a magnet.</p> <p>Spatial division.</p>



<p>285 &gt;</p> <p>346 &gt;</p>	<p>division rather than a frequency division. Just by varying space you could maintain independence of transmission. Had developed this in conjunction with the National Measurement Laboratories for use in schools - where could have a hearing impaired school child wearing this in one room could go out of one class into another class into another class into another class without changing anything on their device - just by moving from one room into another room. CAL commercially manufactured these - made by Plessey &amp; they are in use in schools in NSW at the moment. Gore took it to USA to show type of development work going on in hearing aids for use in schools - also try &amp; get their backing for application CAL had made to the international group who registers &amp; approves frequencies for use in auditory trainers in schools. This group ultimately gave CAL a group of frequencies for universal use throughout the world - with the recommendation that if there is a need for an auditory training system, this is the preferred system. They meet every 20 years &amp; that conference was held in Switzerland in 1980 (Gore thinks). <b>Another thing - the government said - you are going to USA with all expenses paid to this conference on hearing aid design - we can expand that visit &amp; you can go &amp; visit the east &amp; north west of USA &amp; see all these hearing aid component manufacturers &amp; talk to them about our requirements, find out what is being developed, etc. - so Gore got a grand tour. Gore visited three groups of people - first was the high level hearing aid design researchers -the people who develop procedures &amp; the need for certain things. Then had the opportunity of visiting the hearing aid component manufacturers &amp; found some very interesting things - a group of researchers who were very frustrated. They do their high level research work &amp; they publish their results &amp; it sits there - nothing happens. Then Gore went to manufacturers &amp; asked - how do you decide what you are going to manufacture next year ? - reply - we go out &amp; visit the people who buy these components &amp; say - what are you prepared to buy next year ? - &amp; there is invariably a trend towards the 'turning wheel' - i.e. I want that volume control that had a serrated edge on it &amp; the numbers on it which you used to manufacture 5 years ago. Then they say this audiologist wants this sort of volume control, this audiologist wants this type of hearing aid &amp; this performance, etc - then they go back to their manufacturing plant &amp; play the numbers game - have got 100 people who want that, 10 people who want that, therefore we are not interested in developing for the 10, we'll develop for the 100 - manufacture &amp; make available on the market. Only trouble with that system is that the people who set the rules, the doctors &amp; audiologists prescribing &amp; fitting hearing aids have not got time to read the research articles &amp; don't know what the research problem is, i.e. it is a problem between research &amp; development - exactly the same problem have in Australia &amp; all over world. Gore obtained quite lot of background information on what going on in USA - <b>manufacturing techniques, what they capable of manufacturing, what is reasonable to ask of them to develop &amp; the type of information they require to meet CAL's requirements</b> - also personal contact which went a long way. CAL was only manufacturer in Australia at the time - got development samples from USA manufacturers (based information provided to them by CAL about what might be needed in next developmental model), i.e. they will develop a range of prototypes which may need in next model (at no charge) &amp; forward them out to CAL &amp; expect feed back on performance. CAL worked very closely with these manufacturers - a lot of them came out to Australia to visit.</b></p>	<p>Frequency division.</p> <p>National Measurement Laboratories. Hearing impaired school child, movement between class rooms.</p> <p>Plessey, NSW schools.</p> <p>International group, registers &amp; approves frequencies frequencies, Auditory trainers in schools.</p> <p>Switzerland.</p> <p>East &amp; north west USA. Hearing aid component researchers &amp; manufacturers.</p> <p>audiologist.</p> <p>USA, manufacturing techniques.</p> <p>Development samples</p>
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383-406	<b>1979-1987 - Lectured in a series of four day courses on room acoustics, speech intelligibility &amp; application of miniature transducers to a range of government &amp; semi-government organisations</b> Gore was not prepared to talk about these courses - he said some of these organisations make you sign a piece of paper that you won't even mention their name so if you do mention their name, it could involve you in legal type complications. It was for bodies who are legally allowed to carry out this type of work	Lectured in a series of four day courses on room acoustics, speech intelligibility & application of miniature transducers to a range of government & semi-government organisations
406	<b>End of Tape IEA SYD : DWB 21, Side B</b>	

## Tape Log

Tape: IEA SYD: DWB 22, Side A		
COUNT	SUBJECT	NAMES & KEYWORDS
000-005	Tape Identification	
005-093	<p><b>1983 - Transducer suspension patent</b></p> <p>Mentioned previously (<i>refer Tape IEA SYD : DWB 21, Side A, at Counter 230</i>) the difference between the three types of hearing aid - ear level, behind ear &amp; body type &amp; the difference being the amount of gain which is limited by acoustic, magnetic &amp; vibration feed-back between the microphone &amp; the earpiece.</p> <p>The closer you place a microphone &amp; an ear phone, the less the gain you have which is limited by these three characteristics.</p> <p>In the 1970's a technology developed which was a very low susceptibility technology to vibration pick up between a microphone &amp; an earphone. This allowed CAL to make fairly high gain hearing aids in the smaller size models but there was still the three types of feedback.</p> <p>One of them, the electro magnetic link between the earphone &amp; the microphone was eliminated by the use of the Electret microphones - that completely eliminated the electro magnetic side of it.</p> <p>With the advent of these low vibration pick up devices, were still limited by that vibration feedback problem. The state of the art in USA was that all hearing aid organisations purchase from a particular company a very soft type of rubber (which is made to a family propriety secret mixture). This suspends a microphone &amp; also an earphone &amp; makes it further immune to vibration coupling between the two. CAL had been optimising the production mixes of rubber here in Australia &amp; as part of CAL's development procedure, carried out the design of a different type of suspension system which was based on shear isolation.</p> <p>It was particularly effective &amp; it was to combat a problem of feedback in a high gain hearing aid model CAL had in production. CAL had to take care in the installation of the microphone &amp; the earphone to get a high enough yield of hearing aids to be used to be capable of meeting the fitting requirements.</p> <p>When CAL developed this design, Gore said it was one of the most pleasurable moments of his life when just moulded this design in any old neoprene straight off the development dies, to put it in the hearing aid &amp; the feedback disappeared instantly &amp; it did not come back. This took the optimising out of the rubber composition &amp; placed it in a much more efficient design of transducer mounting.</p> <p>Another benefit - this type of design could be used in any type of microphone suspension system - could be used for hi-fi, radio broadcast, anything at all, especially outside broadcasts where they have susceptibility to jarring or any type of vibration pick up noise. So CAL patented the device in Australia &amp; obtained USA &amp; Canadian patents as well - &amp; had European patents in process - then our department decided we would not proceed or go any further with the patent &amp; it was let lapse so the government did not make any financial use of it after all despite it's potential.</p> <p>Why ? - was primarily change in directors in CAL, change in policy of organisation when started to turn into a wholly government owned enterprise - they decided to let all of these patents lapse. CAL had other patents which lapsed as well it was not the only one that lapsed.</p> <p>Last Gore heard, were still using that design in production of very high gain hearing aids.</p>	<p>Transducer suspension patent.</p> <p>Difference between the three types of hearing aid - ear level, behind ear &amp; body type.</p> <p>Gain.</p> <p>Acoustic, magnetic &amp; vibration feedback.</p> <p>Microphone, ear phone.</p> <p>Low susceptibility technology to vibration pick up.</p> <p>CAL.</p> <p>High gain hearing aids.</p> <p>Electret microphones.</p> <p>Electro magnetic link.</p> <p>Special soft rubber, USA.</p> <p>Vibration coupling.</p> <p>Shear isolation.</p> <p>Microphone suspension system, hi-fi, radio broadcast.</p> <p>Australia patent.</p> <p>USA &amp; Canadian patents. European patent in process.</p>



093-250	<p><b>1985 - commissioned &amp; commercially developed the NAL Acoustical Test Facilities.</b></p> <p>Test facilities at previous at Hickson Road (<i>talked about earlier - refer Tape IEA SYD : DWB 20, Side A at Counter 328</i>) had only one anechoic room - about equivalent size to one of the medium size anechoic rooms at Chatswood. If took a sound level reading instrument in there, would read 80 dBA in that room - a very high level - but it was all below 16 Hz coming off the Harbour Bridge. As it was outside the measurement frequency of the room, it did not bother us too much. But it was barely adequate as an anechoic room - could only get performance on a limited range of tests. The new rooms at Chatswood have not restricted us in any way - they are absolutely superb.</p>	<p>NAL Acoustical Test Facilities, Hickson Road. Limits of these facilities.</p> <p>Anechoic room, Chatswood.</p> <p>Sydney Harbour Bridge.</p>
118 >	<p><b>Selection of site at Chatswood</b> - Gore said he did not know if other sites considered - that happened at a higher level than he was in the organisation. For many years had been tied to old wool stores - buildings with timber frames &amp; heavy dense sandstone block walls on the outside because modern buildings are invariably built on a metal frame &amp; if you drop a pin down in the basement, you will read it on your acoustical &amp; vibration instruments up in the roof. So it is entirely unrealistic trying to develop an acoustic laboratory in this type of building. At about that period the government must have had a reversal of heart &amp; they said you can design &amp; develop your own building to meet your requirements - go out &amp; find a site.</p>	<p>Selection of Chatswood site.</p> <p>Old wool stores.</p>
151 >	<p>Had a choice of 26 government sites around the metropolitan area. Went out with instruments &amp; measured ground vibration &amp; air vibration, had a look at aircraft flight paths &amp; projected air flight paths, new road plans, etc. &amp; found that site at Chatswood had the lowest air borne sound levels, lowest ground vibration &amp; it was nowhere near any of those planned new service routes. It also had the advantage of being near the Royal North Shore Hospital for the Ultrasonics Institute which was then part of the organisation - they were fully engaged in the medical applications of ultrasonics.</p>	<p>26 government sites around metropolitan area.</p> <p>Royal North Shore Hospital, Ultrasonics Unit, medical applications of ultrasonics.</p>
163 >	<p><b>So decided on the Chatswood site</b> which had the advantage of being in a valley - could excavate into side of valley as a noise buffer - could bury ourselves in excavation &amp; could have all personnel offices along outside wall exposed to the valley as a noise buffer, followed by corridors as an additional noise buffer, followed by less noise sensitive laboratories as an additional noise buffer &amp; then have all of the highly noise sensitive areas built in against the excavation wall - which was done.</p> <p><b>This Chatswood laboratory was built for acoustics.</b></p> <p>CAL did almost all of own specifying requirements. Two high level CAL people &amp; one person high up in the Public Works Dept went around the world &amp; they visited quite a few acoustical test facilities &amp; in amongst the questions they asked - was an extremely important one - if you were doing it all again, what would you avoid doing ? What would you try &amp; not design into the problem? So they came back &amp; designed all the nasties out of the room &amp; our 15 years of experience with this test facility indicates that all the nasties have been designed out.</p>	<p>CAL.</p> <p>Public Works Dept.</p>
183 >	<p>Gore said the test facilities are absolutely superb acoustically - he felt in his opinion, they are the best in the world.</p> <p><b>Other people</b> - at time Gore joined the organisation, the Director was Norman E. Murray &amp; he died in 1967. The Directorship then fell on Ray Piesse - who was Director for almost all of Gore's working life with NAL. Jack Rose was in charge of the Engineering Section under Ray Piesse. Gore worked for Jack Rose, as the only other engineer in the Health Department . Ray Piesse was by profession - a physicist.</p>	<p>Norman E. Murray, Director of NAL (died 1967).</p> <p>Ray Piesse, a physicist, Director of NAL.</p> <p>Jack Rose, in charge Engineering Section.</p>



195 >	<p><b>Location of Chatswood laboratory re public transport access</b> - the Chatswood laboratory is the head office &amp; the acoustical research facilities of Australian Hearing Services. Incorporated slightly differently now - Australian Hearing Services are looking after the operational side of the organisation &amp; the National Health side of things &amp; hearing aids, including the management of all the regional laboratories throughout Australia, including permanently established visiting laboratories &amp; travelling teams going out to remote areas fitting hearing aids. They control them.</p> <p>National Acoustic Laboratories is now the research branch for acoustical research which is attached to Australian Hearing Services.</p> <p>The group Gore currently working for at moment - the acoustical test facilities have recently become (were part of National Acoustical Laboratories) part of a business unit which has been formed to manage all of the commercial aspects of all of the services at Chatswood.</p> <p>Gore said transport at Chatswood is not important for clients because it is not a fitting laboratory - it is a research laboratory. There is a small clinic at Chatswood which trials new hearing aid test procedures on a range of clients who are invited to Chatswood to come there for the purpose. Usually the difficult people, those who are hard to fit, the people who are problem people in terms of fitting hearing aids, the people who the commercial industries have given away - NAL investigate their problems &amp; try to fit them with a hearing aid or develop a new testing procedure to identify their problem &amp; the type of hearing aid that can be matched to it.</p>	<p>Public transport access.</p> <p>Australian Services.</p> <p>Regional laboratories throughout Australia, permanently established visiting laboratories. National Acoustic Laboratories (NAL), research branch for acoustical research.</p> <p>Commercial aspects.</p> <p>Chatswood - a research facility, small clinic for difficult people for hearing aids.</p>
250-320	<p><b>1986 - Chairman of tripartite committee which introduced the Occupational Noise Regulations &amp; Codes of Practice for Australia in 1992.</b></p> <p>Started in 1986 &amp; carried through to 1992 when the Regulations were issued.</p> <p>The Regulations changed the National Health &amp; Medical Research Organisation's recommendation of 90 dBA (they made that recommendation back in 1972) to 85 dBA.</p> <p>With tripartite committee difficult to get consensus - unions forming one side of it with their own policies, the Chamber of Manufacturers forming another body &amp; they had their own policies &amp; then had government people primarily forming an overview &amp; a lot of lobbying going on - but reaching consensus was very difficult.</p> <p>Took into view all of the overseas regulations &amp; procedures &amp; trends &amp; then tried to adapt them to the Australian scene. One aspect hanging in the background was the increase in hearing compensation in the law courts - that probably was the deciding factor in a consensus being reached otherwise probably would have still been debating the issues.</p> <p>Impact of these Regulations &amp; Codes on industry generally - the NHMRO recommendation was purely a recommendation - the National Occupational Health &amp; Safety Commission decision of 1992 was also only a recommendation because of the way the noise laws are organised in Australia. Each state has its own noise laws &amp; the overall view is set by the National Occupational Health &amp; Safety Commission - they make the recommendation &amp; the local bodies legal people take up the reins &amp; put the regulations into law if they think that those recommendations are worth being applied in Australia. Gore said he does not know anything about the implementation side of it in any state because they came out in 1992, the year he retired.</p>	<p>Tripartite committee, Occupational Noise Regulations &amp; Codes of Practice for Australia.</p> <p>National Health &amp; Medical Research Organisation (NHMRO).</p> <p>Unions, Chamber of Manufacturers, government people.</p> <p>Hearing compensation, law courts.</p> <p>National Occupational Health &amp; Safety Commission.</p>



320-410	<p><b>1987 - Kuala Lumpur - delegate representing Australia to first World Health Organisation (WHO) conference on noise issues &amp; problems in the "East".</b></p> <p>In that year the WHO was very interested in obtaining information on the noise situation regards hearing conservation in the "East", so they invited a number of countries to send a representative who would put the situation to them so that they could summarise &amp; obtain an overview of the situation in the "East". Their mechanism for appointment of an Australian representative was to contact the Commonwealth Minister for Health in Australia who immediately advertised for a person to represent the view on Australia. The Chairman of the National Occupational Health &amp; Safety Commission thought Gore should apply so he prepared a resume which went to the Health Dept in Canberra &amp; they chose Gore to be the representative.</p> <p>WHO maintains an establishment within the University of Malaysia in Kuala Lumpur - Gore could not recall the name of the organisation - that was where the conference was held.</p> <p>Gore prepared a paper on the legal situation in Australia for Hearing Conservation (quite comprehensive document) because each state has it's own noise laws &amp; procedures for doing things.</p> <p><b>Just about every "Eastern" country was represented -</b> Korea, Malaysia, Philippines, Indonesia, Japan, China, Hong Kong, etc &amp; as conference started it appeared the WHO people did not know anything about the noise situation in the "East", so the entire conference turned to one of - <b>what is the noise situation in the "East"</b> - all types of noise - &amp; it appeared that by far the greatest problem is traffic noise, all through the "East", especially Hong Kong. The noise problems are absolutely horrendous there.</p> <p><b>On the hearing conservation side</b>, there were also horrendous problems as well - tied in with the climate &amp; the need for the open atmosphere because of the heat &amp; air conditioners going - just about every window in every flat has an air conditioner hanging out of it &amp; cars everywhere.</p>	<p>Kuala Lumpur, first World Health Organisation (WHO) conference on noise issues &amp; problems in the "East".</p> <p>Commonwealth Minister for Health.</p> <p>Health Dept., Canberra.</p> <p>University of Malaysia in Kuala Lumpur.</p> <p>Hearing conservation.</p> <p>Korea, Malaysia, Philippines, Indonesia, Japan, China, Hong Kong.</p> <p>Traffic noise.</p>
410	<b>End of Tape IEA SYD ; DWB 22, Side A</b>	

## Tape Log

Tape: IEA SYD: DWB 22, Side B		
COUNT	SUBJECT	NAMES & KEYWORDS
000-004	Tape Identification	
004-015	<p><i>Continued from Tape IEA SYD : DWB 22, Side A.....</i></p> <p><b>1987 - Kuala Lumpur - World Health Organisation (WHO) conference on noise issues &amp; problems in the "East".</b> Towards end of conference, all the papers were summarised &amp; an overall view of the hearing conservation side prepared &amp; placed in their library - Gore said he is not aware of any follow up action or what use that information was put too - said all he knows is that the information on the situation is there in the WHO library in the University of Malaysia in Kuala Lumpur.</p>	<p>Kuala Lumpur, World Health Organisation (WHO) conference on noise issues &amp; problems in the "East". Hearing conservation.</p> <p>WHO library in the University of Malaysia in Kuala Lumpur.</p>
015-051	<p><b>1987 - assisted The Institution of Engineers, Australia to prepare an article on the National Acoustical Laboratories Acoustical Test facilities.</b> Gore said he got a call from an Engineer Class 1 who was on The Institution of Engineers staff - he wanted to write an article on the new test facilities at NAL. Gore said he came up here &amp; then went away &amp; wrote his article &amp; he published it. Gore said he did not ask Gore's advice on the finished draft - it appeared in The Institution of Engineers magazine &amp; Gore read it &amp; in it he was in favour of all the facilities with the exception of the two reverberation rooms. Because of the recent advent of the technique of measuring sound intensities using instruments, he declared that the reverberation rooms were white elephant, were technically obsolete &amp; would be redundant. The only problem was that that article going out in the field started the rush on the use of the reverberation rooms - a rush which has built up &amp; built up to the point where their occupancy is now in the region of about 95% of the available time. The point he missed was that <u>all building materials</u> &amp; so forth which are tested <u>are tested to a standard</u> - eg. an IEC or ASTM or Standards Australia one or whatever. Those standards rely heavily on the techniques used to carry out the measurements in the reverberation rooms - not sound intensity. Sound intensity seemed to have passed by the wayside- Gore doesn't know why - said it is a very valid &amp; good technique but he missed out on that point. Apart from that Gore said it was quite a good article.</p>	<p>The Institution of Engineers, Australia. Article on the National Acoustical Laboratories Acoustical Test facilities.</p> <p>Reverberation rooms. Sound intensity measurement.</p> <p>Building materials. Standards - IEC (International Electro Technical Commission), ASTM (American Society for Testing Engineering Materials), Standards Australia.</p>
051-097	<p><b>1987 - advised the "Beyond 2000" organisation when they prepared a TV program on the Acoustical Test facilities</b> It involved a layman's view of how the rooms operated, including exposure of the environments &amp; a commentator's impressions of the environments. Possibly the most interesting thing was that have a low frequency measurement installation - a horizontal plane wave tube which is capable of taking an acoustical measurement from 15 Hz upwards. Gore said he doesn't know of any other installation in the world capable of taking a measurement to International standards requirements from 15 Hz upwards. This camera crew looked at the horizontal plane wave tube &amp; said - how can we show an audience what happens in this tube as it is going along ? - we can't see a sound wave as it progresses up the tube - so if we put a row of candles up the middle of the tube &amp; bring in the high speed camera, we could possibly slow the</p>	<p>Beyond 2000. TV program on Acoustical Test facilities.</p> <p>Low frequency measurement installation - a horizontal plane wave tube.</p>



	<p>speed of the wave down so you could see the camera react as the wave passes the tube. It's only going at 300 metres/second. They filmed the tube in operation - when we turned the sound source on at 15 Hz the candles would jiggle up &amp; down like mad - when turned the sound source off, the candles were steady. They recorded this &amp; they could not get the speed of the camera up high enough to capture the wave as it travelled up the candles. So what went to air was with the sound source on, they had captured the motion of the diaphragm of the speaker going in &amp; out - you could see the diaphragm of the speaker going in &amp; out, the candles jiggling like mad. Then we turned off the sound source &amp; the speaker diaphragm was still &amp; the candles were rock steady - that's what went to air.</p> <p>Gore commented that he had never met a more sick crew when they walked out of that chamber - because infrasonics (i.e. below hearing) are very close to the body rhythms, they can react with the body rhythms - that crew was rather 'pale about the gills' when they walked out.</p> <p>That programme was shown right around the world - don't think it brought any business.</p>	<p>Infrasonics (i.e. below hearing). Body rhythms.</p>
097-118	<p><b>1988 - the Acoustical Test facilities awarded a place in The Institution of Engineers, Australia Excellence Awards competition</b></p> <p>The firm who fitted out the rooms thought it would be a good if they entered the large anechoic room - so they put it in. That year new train - Tangara - won first prize &amp; NAL won second prize for engineering excellence.</p>	<p>The Institution of Engineers, Australia Excellence Awards competition. Large anechoic room.</p>
118-133	<p><b>1990 - Australian Acoustical Society bestowed a "Highly Commended" in an Excellence in Acoustics competition.</b></p> <p>Again, the firm who fitted out the rooms entered the large anechoic room - &amp; it was awarded "Highly Commended".</p>	<p>Australian Acoustical Society - "Highly Commended" in an Excellence in Acoustics competition.</p>
133-149	<p><b><u>Memberships &amp; Organisations :</u></b></p> <p><b>Australian Acoustical Society</b> Gore is still a member of Society. Membership of this Society is a 'qualification' (like The Institution of Engineers, Australia) having the qualification is very useful if you are out as a private consultant working in the field &amp; also keep in touch with what is going on through their magazine. Has been a member ever since joining as a foundation member - recalls this was about 1980.</p>	<p>Australian Acoustical Society.</p> <p>Foundation member.</p>
149-176	<p><b>Standards Australia - various committees on performance of Hearing Aids, Loop Systems &amp; Hi-Fidelity equipment</b></p> <p>Been involved with Standards Australia since about 1972-73 &amp; been on quite a few committees over the years..</p> <p>Gore said that one of the requirements of Standards Australia is that you must belong to an organisation - he said that if on a committee, you must represent that organisation's point of view. When Gore retired in 1992 - all committees lost interest in him being on committee except one &amp; that was the Hi-Fi equipment one which he is still on, Gore thinks primarily because of lack of expertise in the field &amp; lack of suitable people around to meet that requirement.</p>	<p>Standards Australia committees, performance of hearing aids, Loop Systems, Hi-Fidelity equipment.</p>
176-221	<p><b>NATA (National Association of Testing Authorities Aust.) - assessor of organisations seeking registration.</b></p> <p>Gore has been since late 1970's &amp; still does assessments for them - advising on acoustic &amp; vibration matters. Is a member of their advisory committee &amp; Gore heads a committee investigating &amp; developing a new type of requirements for organisations to meet in their registrations.</p>	<p>NATA (National Association of Testing Authorities Aust.). Assessor of organisations seeking registration - acoustic &amp; vibration matters.</p>



	<p>About two years ago, NATA sent Gore to International Accreditation New Zealand to take do some assessments in Auckland &amp; in Wellington. He did that &amp; last year he became an accredited assessor for International Standards in New Zealand. It is all purely an honorary role (no remuneration) - but they do pay expenses.</p> <p>NATA is now recognised throughout the world &amp; they have been actively associating themselves with overseas organisations carrying out the same work for many years now &amp; they have reached a very high standard of acceptance throughout the world. If you meet NATA registration requirements in Australia, then you will pass it in New Zealand, USA ,UK &amp; so on - get equivalent recognition.</p> <p>That is, if a firm manufactures an item, it will be recognised in USA or UK purely because it has a NATA accreditation - i.e. been manufactured by a NATA accredited firm.</p>	<p>International Accreditation New Zealand. Auckland, Wellington.</p> <p>NATA registration. New Zealand, USA, UK.</p>
221-324	<p><b><u>Any other matters :</u></b></p> <p><b>'Bionic ear' development program</b></p> <p>NAL was not involved at all in this development program. Gore said he knows Graeme Clark very well &amp; also his development team, especially on the development side, Jim Fitzpatrick, in particular. Involved yes - on the side in miniature microization techniques where pooled resources on a number of times.</p> <p>Gore said for many years had a mistaken idea of the bionic ear development program. Gore said he has always regarded it as an invasive type thing which was quite traumatic, involved considerable expense &amp; Gore was of the impression you would get far more developing a vibro tactile type approach.</p> <p>But when Gore visited the program at the University of Maine in Orono, USA (<i>refer earlier Tape IEA SYD : DWB 21, Side B at Counter 190-383</i>), &amp; lectured there he met some researchers in the field from the University of Chicago &amp; said his scepticism must have shown. This doctor said 'I was of your impression when I joined the program at the University of Chicago' but when you meet a person who is completely deaf, utterly deaf, &amp; his only interest in contact with the world outside is - if I step off that gutter will a car knock me down ? - &amp; he can hear the car coming with an implant, you begin to revise your impression. After Gore talked with him at length of the pro's &amp; con's of vibro tactile devices, hearing aids &amp; ear implants, Gore said he developed an approach that any type of meaningful contact with the outside world is advantageous, even body expressions, facial expressions, anything that conveys information to a deaf person is worthwhile. Gore said he has not had reason to change that impression since then - so he now includes the bionic ear in his concepts.</p> <p>Gore commented that in the USA they only had the one, two or three electrical probes going into the organ of Corti - with the bionic ear program they have a large number of them going in so they have contact with the different tonal areas on the Corti substrate &amp; they can stimulate the different areas of that organ according to the input information. It involves quite a bit of signals processing, but the person who receives that information doesn't receive speech - he receives a sound that he has to be trained to recognise. So the process very heavily favours those people who originally had a history of hearing &amp; know what speech sounds like.</p> <p>Gore noticed Graeme Clark was very particular in the type of people he fitted initially in the program.</p> <p>Professor Graeme Clark is the head of the bionic ear program in the University of Melbourne. Very knowledgeable person - very</p>	<p>'Bionic ear' development program. Professor Graeme Clark, Head of 'Bionic Ear' Development Program, Jim Fitzpatrick, head Development Engineer, University of Melbourne. Miniature microization techniques. Vibro tactile approach. University of Maine, in Orono, USA. University of Chicago.</p> <p>Completely deaf person.</p> <p>Electrical probes. Organ of Corti. Tonal areas.</p> <p>Speech, sounds.</p>



	<p>good at public relations -&amp; he has achieved quite a measure of success.</p> <p>Jim Fitzpatrick is his head development engineer - a very knowledgeable person.</p> <p>NAL is now involved with the program - but Gore doesn't know what the involvement is - possibly on the speech processing side because there is still a lot to be done in recognition in the type of stimulus which is going into the organ of Corti.</p> <p>Gore said he personally played only a peripheral part - talking about the electronics &amp; processing side.</p>	National Acoustics Laboratory (NAL).
324-340	<b>Close of Interview, thanks &amp; general comments</b>	
340	<b>End of Tape IEA DWB 22, Side B</b>	